



## SEQUENCE LISTING

<110> Dahiyat, Bassil I.  
Filikov, Anton

<120> DESIGN AND DISCOVERY OF PROTEIN BASED TNF-ALPHA FOR THE TREATMENT OF  
TNF-ALPHA RELATED DISORDERS

<130> A-68990-3/RFT/RMS/RMK

<140> US 09/981,289

<141> 2001-10-15

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<151> 2000-03-02

<150> US 09/945,150

<151> 2001-08-31

<150> US 09/798,789

<151> 2001-03-02

<160> 30

<170> PatentIn version 3.1

<210> 1

<211> 495

<212> DNA

<213> Homo sapiens

<400> 1

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aacgctctgc tggctaacgg tgtagaactg cgcgacaacc agctggtagt accgtccgaa 180  
ggctctgtacc tgatctactc ccaggctactg ttcaaaggctc agggttgtcc gtccactcac 240  
gtactgctga ctcacactat ctcccgcatc gctgtatcct accagactaa agtaaacctg 300  
ctgtccgcta tcaaatcccc gtgtcagcgc gaaactccgg aagggtgctga agctaaaccg 360  
tggtagcaac cgatctacct gggtagtgta ttccagctgg aaaaagggtga ccgcctgtcc 420  
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<210> 2

<211> 164

<212> PRT

<213> Homo sapiens

<220>

<221> mat\_peptide

<222> (8)..()

<223>

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<400> 2

Met His His His His His His Val Arg Ser Ser Ser Arg Thr Pro Ser  
-5 -1 1 5

Asp Lys Pro Val Ala His Val Val Ala Asn Pro Gln Ala Glu Gly Gln  
10 15 20 25

Leu Gln Trp Leu Asn Arg Arg Ala Asn Ala Leu Leu Ala Asn Gly Val  
30 35 40

Glu Leu Arg Asp Asn Gln Leu Val Val Pro Ser Glu Gly Leu Tyr Leu  
45 50 55

Ile Tyr Ser Gln Val Leu Phe Lys Gly Gln Gly Cys Pro Ser Thr His  
60 65 70

Val Leu Leu Thr His Thr Ile Ser Arg Ile Ala Val Ser Tyr Gln Thr  
75 80 85

Lys Val Asn Leu Leu Ser Ala Ile Lys Ser Pro Cys Gln Arg Glu Thr  
90 95 100 105

Pro Glu Gly Ala Glu Ala Lys Pro Trp Tyr Glu Pro Ile Tyr Leu Gly  
110 115 120

Gly Val Phe Gln Leu Glu Lys Gly Asp Arg Leu Ser Ala Glu Ile Asn  
125 130 135

Arg Pro Asp Tyr Leu Asp Phe Ala Glu Ser Gly Gln Val Tyr Phe Gly  
140 145 150

Ile Ile Ala Leu  
155

<210> 3

<211> 43

<212> PRT

<213> Homo sapiens

<400> 3

Asp Gln Asp Lys Ile Glu Ala Leu Ser Ser Lys Val Gln Gln Leu Glu  
1 5 10 15

Arg Ser Ile Gly Leu Lys Asp Leu Ala Met Ala Asp Leu Glu Gln Lys  
20 25 30

Val Leu Glu Met Glu Ala Ser Thr Tyr Asp Gly  
35 40

<210> 4  
<211> 43  
<212> PRT  
<213> Homo sapiens

<400> 4

Val Ala Arg Asn Thr Gly Leu Leu Glu Ser Gln Leu Ser Arg His Asp  
1 5 10 15

Gln Met Leu Ser Val His Asp Ile Arg Leu Ala Asp Met Asp Leu Arg  
20 25 30

Phe Gln Val Leu Glu Thr Ala Ser Tyr Asn Gly  
35 40

<210> 5  
<211> 43  
<212> PRT  
<213> Homo sapiens

<400> 5

Asn Asp Gln Arg Leu Ala Val Leu Glu Glu Glu Thr Asn Lys His Asp  
1 5 10 15

Thr His Ile Asn Ile His Lys Ala Gln Leu Ser Lys Asn Glu Glu Arg  
20 25 30

Phe Lys Leu Leu Glu Gly Thr Cys Tyr Asn Gly  
35 40

<210> 6  
<211> 43  
<212> PRT  
<213> Homo sapiens

<400> 6

Asp Arg Glu Arg Ile Leu Ser Leu Glu Gln Arg Val Val Glu Leu Gln  
1 5 10 15

Gln Thr Leu Ala Gln Lys Asp Gln Ala Leu Gly Lys Leu Glu Gln Ser  
20 25 30

Leu Arg Leu Met Glu Glu Ala Ser Phe Asp Gly  
35 40

<210> 7  
 <211> 43  
 <212> PRT  
 <213> Homo sapiens

<400> 7

Gln Asp His Gln Ile Arg Glu Leu Thr Ala Lys Met Glu Thr Gln Ser  
 1 5 10 15

Met Tyr Val Ser Glu Leu Lys Arg Thr Ile Arg Thr Leu Glu Asp Lys  
 20 25 30

Val Ala Glu Ile Glu Ala Gln Gln Cys Asn Gly  
 35 40

<210> 8  
 <211> 27  
 <212> PRT  
 <213> Homo sapiens

<400> 8

Cys Ala Leu Val Ser Arg Gln Arg Gln Glu Leu Gln Glu Leu Arg Arg  
 1 5 10 15

Glu Leu Glu Glu Leu Ser Val Gly Ser Asp Gly  
 20 25

<210> 9  
 <211> 157  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> synthetic

<400> 9

Val Arg Ser Ser Ser Arg Thr Pro Ser Asp Lys Pro Val Ala His Val  
 1 5 10 15

Val Ala Asn Pro Arg Ala Glu Gly Gln Leu Gln Trp Leu Asn Arg Arg  
 20 25 30

Ala Asn Ala Leu Leu Ala Asn Gly Val Glu Leu Arg Asp Asn Gln Leu  
 35 40 45

Val Val Pro Ser Glu Gly Leu Tyr Leu Ile Tyr Ser Gln Val Leu Phe  
 50 55 60

Lys Gly Gln Gly Cys Pro Ser Thr His Val Leu Leu Thr His Thr Ile

65		70		75		80									
Ser	Arg	Ile	Ala	Val	Ser	Tyr	Gln	Thr	Lys	Val	Asn	Leu	Leu	Ser	Ala
			85						90					95	
Ile	Lys	Ser	Pro	Cys	Gln	Arg	Glu	Thr	Pro	Glu	Gly	Ala	Glu	Ala	Lys
			100					105						110	
Pro	Trp	Tyr	Glu	Pro	Ile	Tyr	Leu	Gly	Gly	Val	Phe	Gln	Leu	Glu	Lys
		115					120					125			
Gly	Asp	Arg	Leu	Ser	Ala	Glu	Ile	Asn	Arg	Pro	Asp	Tyr	Leu	Asp	Phe
	130					135					140				
Ala	Glu	Ser	Gly	Gln	Val	Tyr	Phe	Gly	Ile	Ile	Ala	Leu			
145					150					155					
<210> 10															
<211> 157															
<212> PRT															
<213> Artificial Sequence															
<220>															
<223> synthetic															
<400> 10															
Val	Arg	Ser	Ser	Ser	Arg	Thr	Pro	Ser	Asp	Lys	Pro	Val	Ala	His	Val
1				5					10					15	
Val	Ala	Asn	Pro	Gln	Ala	Glu	Gly	Gln	Leu	Gln	Trp	Leu	Asp	Arg	Arg
			20					25					30		
Ala	Asn	Ala	Leu	Leu	Ala	Asn	Gly	Val	Glu	Leu	Arg	Asp	Asn	Gln	Leu
	35						40					45			
Val	Val	Pro	Ser	Glu	Gly	Leu	Tyr	Leu	Ile	Tyr	Ser	Gln	Val	Leu	Phe
	50					55					60				
Lys	Gly	Gln	Gly	Cys	Pro	Ser	Thr	His	Val	Leu	Leu	Thr	His	Thr	Ile
65					70					75				80	
Ser	Arg	Ile	Ala	Val	Ser	Tyr	Gln	Thr	Lys	Val	Asn	Leu	Leu	Ser	Ala
			85						90					95	
Ile	Lys	Ser	Pro	Cys	Gln	Arg	Glu	Thr	Pro	Glu	Gly	Ala	Glu	Ala	Lys
			100					105						110	

Pro Trp Tyr Glu Pro Ile Tyr Leu Gly Gly Val Phe Gln Leu Glu Lys  
           115                          120                          125

Gly Asp Arg Leu Ser Ala Glu Ile Asn Arg Pro Asp Tyr Leu Asp Phe  
           130                          135                          140

Ala Glu Ser Gly Gln Val Tyr Phe Gly Ile Ile Ala Leu  
   145                          150                          155

<210> 11  
 <211> 157  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> synthetic]

<220>  
 <221> MISC\_FEATURE  
 <222> (31)..(31)  
 <223> "Xaa" at position 31 can be Ile, Asp, or Glu

<400> 11

Val Arg Ser Ser Ser Arg Thr Pro Ser Asp Lys Pro Val Ala His Val  
   1                          5                          10                          15

Val Ala Asn Pro Gln Ala Glu Gly Gln Leu Gln Trp Leu Asn Xaa Arg  
           20                          25                          30

Ala Asn Ala Leu Leu Ala Asn Gly Val Glu Leu Arg Asp Asn Gln Leu  
           35                          40                          45

Val Val Pro Ser Glu Gly Leu Tyr Leu Ile Tyr Ser Gln Val Leu Phe  
   50                          55                          60

Lys Gly Gln Gly Cys Pro Ser Thr His Val Leu Leu Thr His Thr Ile  
   65                          70                          75                          80

Ser Arg Ile Ala Val Ser Tyr Gln Thr Lys Val Asn Leu Leu Ser Ala  
           85                          90                          95

Ile Lys Ser Pro Cys Gln Arg Glu Thr Pro Glu Gly Ala Glu Ala Lys  
           100                          105                          110

Pro Trp Tyr Glu Pro Ile Tyr Leu Gly Gly Val Phe Gln Leu Glu Lys  
           115                          120                          125

Gly Asp Arg Leu Ser Ala Glu Ile Asn Arg Pro Asp Tyr Leu Asp Phe

130

135

140

Ala Glu Ser Gly Gln Val Tyr Phe Gly Ile Ile Ala Leu  
 145 150 155

<210> 12  
 <211> 157  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> synthetic

<220>  
 <221> MISC\_FEATURE  
 <222> (32)..(32)  
 <223> "Xaa" at position 32 can be Asp, Glu or Ser

<400> 12

Val Arg Ser Ser Ser Arg Thr Pro Ser Asp Lys Pro Val Ala His Val  
 1 5 10 15

Val Ala Asn Pro Gln Ala Glu Gly Gln Leu Gln Trp Leu Asn Arg Xaa  
 20 25 30

Ala Asn Ala Leu Leu Ala Asn Gly Val Glu Leu Arg Asp Asn Gln Leu  
 35 40 45

Val Val Pro Ser Glu Gly Leu Tyr Leu Ile Tyr Ser Gln Val Leu Phe  
 50 55 60

Lys Gly Gln Gly Cys Pro Ser Thr His Val Leu Leu Thr His Thr Ile  
 65 70 75 80

Ser Arg Ile Ala Val Ser Tyr Gln Thr Lys Val Asn Leu Leu Ser Ala  
 85 90 95

Ile Lys Ser Pro Cys Gln Arg Glu Thr Pro Glu Gly Ala Glu Ala Lys  
 100 105 110

Pro Trp Tyr Glu Pro Ile Tyr Leu Gly Gly Val Phe Gln Leu Glu Lys  
 115 120 125

Gly Asp Arg Leu Ser Ala Glu Ile Asn Arg Pro Asp Tyr Leu Asp Phe  
 130 135 140

Ala Glu Ser Gly Gln Val Tyr Phe Gly Ile Ile Ala Leu  
 145 150 155

<210> 13  
 <211> 157  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> synthetic

<400> 13

Val Arg Ser Ser Ser Arg Thr Pro Ser Asp Lys Pro Val Ala His Val  
 1 5 10 15

Val Ala Asn Pro Gln Ala Glu Gly Gln Leu Gln Trp Leu Asn Arg Arg  
 20 25 30

Glu Asn Ala Leu Leu Ala Asn Gly Val Glu Leu Arg Asp Asn Gln Leu  
 35 40 45

Val Val Pro Ser Glu Gly Leu Tyr Leu Ile Tyr Ser Gln Val Leu Phe  
 50 55 60

Lys Gly Gln Gly Cys Pro Ser Thr His Val Leu Leu Thr His Thr Ile  
 65 70 75 80

Ser Arg Ile Ala Val Ser Tyr Gln Thr Lys Val Asn Leu Leu Ser Ala  
 85 90 95

Ile Lys Ser Pro Cys Gln Arg Glu Thr Pro Glu Gly Ala Glu Ala Lys  
 100 105 110

Pro Trp Tyr Glu Pro Ile Tyr Leu Gly Gly Val Phe Gln Leu Glu Lys  
 115 120 125

Gly Asp Arg Leu Ser Ala Glu Ile Asn Arg Pro Asp Tyr Leu Asp Phe  
 130 135 140

Ala Glu Ser Gly Gln Val Tyr Phe Gly Ile Ile Ala Leu  
 145 150 155

<210> 14  
 <211> 157  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> synthetic

<400> 14



Val Arg Ser Ser Ser Arg Thr Pro Ser Asp Lys Pro Val Ala His Val  
 1 5 10 15

Val Ala Asn Pro Gln Ala Glu Gly Gln Leu Gln Trp Leu Asn Arg Arg  
 20 25 30

Ala Asn Ser Leu Leu Ala Asn Gly Val Glu Leu Arg Asp Asn Gln Leu  
 35 40 45

Val Val Pro Ser Glu Gly Leu Tyr Leu Ile Tyr Ser Gln Val Leu Phe  
 50 55 60

Lys Gly Gln Gly Cys Pro Ser Thr His Val Leu Leu Thr His Thr Ile  
 65 70 75 80

Ser Arg Ile Ala Val Ser Tyr Gln Thr Lys Val Asn Leu Leu Ser Ala  
 85 90 95

Ile Lys Ser Pro Cys Gln Arg Glu Thr Pro Glu Gly Ala Glu Ala Lys  
 100 105 110

Pro Trp Tyr Glu Pro Ile Tyr Leu Gly Gly Val Phe Gln Leu Glu Lys  
 115 120 125

Gly Asp Arg Leu Ser Ala Glu Ile Asn Arg Pro Asp Tyr Leu Asp Phe  
 130 135 140

Ala Glu Ser Gly Gln Val Tyr Phe Gly Ile Ile Ala Leu  
 145 150 155

<210> 15

<211> 157

<212> PRT

<213> Artificial Sequence

<220>

<223> synthetic

<220>

<221> MISC\_FEATURE

<222> (65)..(65)

<223> "Xaa" at position 65 can be Asp, Thr, Met, Trp, Ile, Gln, Ser, Asn, Val or Glu

<400> 15

Val Arg Ser Ser Ser Arg Thr Pro Ser Asp Lys Pro Val Ala His Val  
 1 5 10 15

Val Ala Asn Pro Gln Ala Glu Gly Gln Leu Gln Trp Leu Asn Arg Arg  
20 25 30

Ala Asn Ala Leu Leu Ala Asn Gly Val Glu Leu Arg Asp Asn Gln Leu  
35 40 45

Val Val Pro Ser Glu Gly Leu Tyr Leu Ile Tyr Ser Gln Val Leu Phe  
50 55 60

Xaa Gly Gln Gly Cys Pro Ser Thr His Val Leu Leu Thr His Thr Ile  
65 70 75 80

Ser Arg Ile Ala Val Ser Tyr Gln Thr Lys Val Asn Leu Leu Ser Ala  
85 90 95

Ile Lys Ser Pro Cys Gln Arg Glu Thr Pro Glu Gly Ala Glu Ala Lys  
100 105 110

Pro Trp Tyr Glu Pro Ile Tyr Leu Gly Gly Val Phe Gln Leu Glu Lys  
115 120 125

Gly Asp Arg Leu Ser Ala Glu Ile Asn Arg Pro Asp Tyr Leu Asp Phe  
130 135 140

Ala Glu Ser Gly Gln Val Tyr Phe Gly Ile Ile Ala Leu  
145 150 155

<210> 16  
<211> 157  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> synthetic

<220>  
<221> MISC\_FEATURE  
<222> (66)..(66)  
<223> "Xaa" at position 66 can be Gln or Lys

<400> 16

Val Arg Ser Ser Ser Arg Thr Pro Ser Asp Lys Pro Val Ala His Val  
1 5 10 15

Val Ala Asn Pro Gln Ala Glu Gly Gln Leu Gln Trp Leu Asn Arg Arg  
20 25 30

Ala Asn Ala Leu Leu Ala Asn Gly Val Glu Leu Arg Asp Asn Gln Leu  
           35                          40                          45

Val Val Pro Ser Glu Gly Leu Tyr Leu Ile Tyr Ser Gln Val Leu Phe  
       50                          55                          60

Lys Xaa Gln Gly Cys Pro Ser Thr His Val Leu Leu Thr His Thr Ile  
   65                          70                          75                          80

Ser Arg Ile Ala Val Ser Tyr Gln Thr Lys Val Asn Leu Leu Ser Ala  
                           85                          90                          95

Ile Lys Ser Pro Cys Gln Arg Glu Thr Pro Glu Gly Ala Glu Ala Lys  
                           100                          105                          110

Pro Trp Tyr Glu Pro Ile Tyr Leu Gly Gly Val Phe Gln Leu Glu Lys  
                           115                          120                          125

Gly Asp Arg Leu Ser Ala Glu Ile Asn Arg Pro Asp Tyr Leu Asp Phe  
                           130                          135                          140

Ala Glu Ser Gly Gln Val Tyr Phe Gly Ile Ile Ala Leu  
   145                          150                          155

<210> 17  
 <211> 157  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> synthetic

<220>  
 <221> MISC\_FEATURE  
 <222> (67)..(67)  
 <223> "Xaa" at position 67 can be Asp, Trp, Tyr, Arg, Lys or Ser

<400> 17

Val Arg Ser Ser Ser Arg Thr Pro Ser Asp Lys Pro Val Ala His Val  
   1                          5                          10                          15

Val Ala Asn Pro Gln Ala Glu Gly Gln Leu Gln Trp Leu Asn Arg Arg  
                           20                          25                          30

Ala Asn Ala Leu Leu Ala Asn Gly Val Glu Leu Arg Asp Asn Gln Leu  
                           35                          40                          45

Val Val Pro Ser Glu Gly Leu Tyr Leu Ile Tyr Ser Gln Val Leu Phe

50                                      55                                      60  
 Lys Gly Xaa Gly Cys Pro Ser Thr His Val Leu Leu Thr His Thr Ile  
 65                                      70                                      75                                      80  
 Ser Arg Ile Ala Val Ser Tyr Gln Thr Lys Val Asn Leu Leu Ser Ala  
                                     85                                      90                                      95  
 Ile Lys Ser Pro Cys Gln Arg Glu Thr Pro Glu Gly Ala Glu Ala Lys  
                                     100                                      105                                      110  
 Pro Trp Tyr Glu Pro Ile Tyr Leu Gly Gly Val Phe Gln Leu Glu Lys  
                                     115                                      120                                      125  
 Gly Asp Arg Leu Ser Ala Glu Ile Asn Arg Pro Asp Tyr Leu Asp Phe  
                                     130                                      135                                      140  
 Ala Glu Ser Gly Gln Val Tyr Phe Gly Ile Ile Ala Leu  
 145                                      150                                      155  
  
 <210> 18  
 <211> 157  
 <212> PRT  
 <213> Artificial Sequence  
  
 <220>  
 <223> synthetic  
  
 <220>  
 <221> MISC\_FEATURE  
 <222> (111)..(111)  
 <223> "Xaa" at position 111 can be Arg or Glu  
  
 <400> 18  
 Val Arg Ser Ser Ser Arg Thr Pro Ser Asp Lys Pro Val Ala His Val  
 1                                      5                                      10                                      15  
 Val Ala Asn Pro Gln Ala Glu Gly Gln Leu Gln Trp Leu Asn Arg Arg  
                                     20                                      25                                      30  
 Ala Asn Ala Leu Leu Ala Asn Gly Val Glu Leu Arg Asp Asn Gln Leu  
                                     35                                      40                                      45  
 Val Val Pro Ser Glu Gly Leu Tyr Leu Ile Tyr Ser Gln Val Leu Phe  
                                     50                                      55                                      60  
 Lys Gly Gln Gly Cys Pro Ser Thr His Val Leu Leu Thr His Thr Ile  
 65                                      70                                      75                                      80

Ser Arg Ile Ala Val Ser Tyr Gln Thr Lys Val Asn Leu Leu Ser Ala  
85 90 95

Ile Lys Ser Pro Cys Gln Arg Glu Thr Pro Glu Gly Ala Glu Xaa Lys  
100 105 110

Pro Trp Tyr Glu Pro Ile Tyr Leu Gly Gly Val Phe Gln Leu Glu Lys  
115 120 125

Gly Asp Arg Leu Ser Ala Glu Ile Asn Arg Pro Asp Tyr Leu Asp Phe  
130 135 140

Ala Glu Ser Gly Gln Val Tyr Phe Gly Ile Ile Ala Leu  
145 150 155

<210> 19  
<211> 157  
<212> PRT  
<213> Artificial Sequence

<220>  
<223> synthetic

<220>  
<221> MISC\_FEATURE  
<222> (112)..(112)  
<223> "Xaa" at position 112 can be Asp or Glu

<400> 19

Val Arg Ser Ser Ser Arg Thr Pro Ser Asp Lys Pro Val Ala His Val  
1 5 10 15

Val Ala Asn Pro Gln Ala Glu Gly Gln Leu Gln Trp Leu Asn Arg Arg  
20 25 30

Ala Asn Ala Leu Leu Ala Asn Gly Val Glu Leu Arg Asp Asn Gln Leu  
35 40 45

Val Val Pro Ser Glu Gly Leu Tyr Leu Ile Tyr Ser Gln Val Leu Phe  
50 55 60

Lys Gly Gln Gly Cys Pro Ser Thr His Val Leu Leu Thr His Thr Ile  
65 70 75 80

Ser Arg Ile Ala Val Ser Tyr Gln Thr Lys Val Asn Leu Leu Ser Ala  
85 90 95

Ile Lys Ser Pro Cys Gln Arg Glu Thr Pro Glu Gly Ala Glu Ala Xaa  
 100 105 110

Pro Trp Tyr Glu Pro Ile Tyr Leu Gly Gly Val Phe Gln Leu Glu Lys  
 115 120 125

Gly Asp Arg Leu Ser Ala Glu Ile Asn Arg Pro Asp Tyr Leu Asp Phe  
 130 135 140

Ala Glu Ser Gly Gln Val Tyr Phe Gly Ile Ile Ala Leu  
 145 150 155

<210> 20  
 <211> 157  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> synthetic

<220>  
 <221> MISC\_FEATURE  
 <222> (115)..(115)  
 <223> "Xaa" at position 115 can be Gln, Lys, Glu, Asn, Arg, Phe, His, Met, Leu, Ile, Trp, Asp, Thr or Ser

<400> 20

Val Arg Ser Ser Ser Arg Thr Pro Ser Asp Lys Pro Val Ala His Val  
 1 5 10 15

Val Ala Asn Pro Gln Ala Glu Gly Gln Leu Gln Trp Leu Asn Arg Arg  
 20 25 30

Ala Asn Ala Leu Leu Ala Asn Gly Val Glu Leu Arg Asp Asn Gln Leu  
 35 40 45

Val Val Pro Ser Glu Gly Leu Tyr Leu Ile Tyr Ser Gln Val Leu Phe  
 50 55 60

Lys Gly Gln Gly Cys Pro Ser Thr His Val Leu Leu Thr His Thr Ile  
 65 70 75 80

Ser Arg Ile Ala Val Ser Tyr Gln Thr Lys Val Asn Leu Leu Ser Ala  
 85 90 95

Ile Lys Ser Pro Cys Gln Arg Glu Thr Pro Glu Gly Ala Glu Ala Lys  
 100 105 110

Pro Trp Xaa Glu Pro Ile Tyr Leu Gly Gly Val Phe Gln Leu Glu Lys  
 115 120 125

Gly Asp Arg Leu Ser Ala Glu Ile Asn Arg Pro Asp Tyr Leu Asp Phe  
 130 135 140

Ala Glu Ser Gly Gln Val Tyr Phe Gly Ile Ile Ala Leu  
 145 150 155

<210> 21  
 <211> 157  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> synthetic

<220>  
 <221> MISC\_FEATURE  
 <222> (140)..(140)  
 <223> "Xaa" at position 140 can be Arg or Lys

<400> 21

Val Arg Ser Ser Ser Arg Thr Pro Ser Asp Lys Pro Val Ala His Val  
 1 5 10 15

Val Ala Asn Pro Gln Ala Glu Gly Gln Leu Gln Trp Leu Asn Arg Arg  
 20 25 30

Ala Asn Ala Leu Leu Ala Asn Gly Val Glu Leu Arg Asp Asn Gln Leu  
 35 40 45

Val Val Pro Ser Glu Gly Leu Tyr Leu Ile Tyr Ser Gln Val Leu Phe  
 50 55 60

Lys Gly Gln Gly Cys Pro Ser Thr His Val Leu Leu Thr His Thr Ile  
 65 70 75 80

Ser Arg Ile Ala Val Ser Tyr Gln Thr Lys Val Asn Leu Leu Ser Ala  
 85 90 95

Ile Lys Ser Pro Cys Gln Arg Glu Thr Pro Glu Gly Ala Glu Ala Lys  
 100 105 110

Pro Trp Tyr Glu Pro Ile Tyr Leu Gly Gly Val Phe Gln Leu Glu Lys  
 115 120 125

Gly Asp Arg Leu Ser Ala Glu Ile Asn Arg Pro Xaa Tyr Leu Asp Phe  
 130 135 140

Ala Glu Ser Gly Gln Val Tyr Phe Gly Ile Ile Ala Leu  
 145 150 155

<210> 22  
 <211> 157  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> synthetic

<220>  
 <221> MISC FEATURE  
 <222> (143)..(143)  
 <223> "Xaa" at position 143 can be Glu, Asn, Gln, Ser, Arg or Lys

<400> 22

Val Arg Ser Ser Ser Arg Thr Pro Ser Asp Lys Pro Val Ala His Val  
 1 5 10 15

Val Ala Asn Pro Gln Ala Glu Gly Gln Leu Gln Trp Leu Asn Arg Arg  
 20 25 30

Ala Asn Ala Leu Leu Ala Asn Gly Val Glu Leu Arg Asp Asn Gln Leu  
 35 40 45

Val Val Pro Ser Glu Gly Leu Tyr Leu Ile Tyr Ser Gln Val Leu Phe  
 50 55 60

Lys Gly Gln Gly Cys Pro Ser Thr His Val Leu Leu Thr His Thr Ile  
 65 70 75 80

Ser Arg Ile Ala Val Ser Tyr Gln Thr Lys Val Asn Leu Leu Ser Ala  
 85 90 95

Ile Lys Ser Pro Cys Gln Arg Glu Thr Pro Glu Gly Ala Glu Ala Lys  
 100 105 110

Pro Trp Tyr Glu Pro Ile Tyr Leu Gly Gly Val Phe Gln Leu Glu Lys  
 115 120 125

Gly Asp Arg Leu Ser Ala Glu Ile Asn Arg Pro Asp Tyr Leu Xaa Phe  
 130 135 140

Ala Glu Ser Gly Gln Val Tyr Phe Gly Ile Ile Ala Leu



155

<400> 23

Ala Glu Ser Gly Gln Val Tyr Phe Gly Ile Ile Ala Leu  
145 150 155

<220>  
<223> synthetic

<220>  
 <221> MISC\_FEATURE  
 <222> (145)..(145)  
 <223> "Xaa" at position 145 can be Arg, Asp, Lys, Asn, His, Thr, Gln, Glu, Tyr, Met, Ser or Phe

<400> 24

Val Arg Ser Ser Ser Arg Thr Pro Ser Asp Lys Pro Val Ala His Val  
 1 5 10 15

Val Ala Asn Pro Gln Ala Glu Gly Gln Leu Gln Trp Leu Asn Arg Arg  
 20 25 30

Ala Asn Ala Leu Leu Ala Asn Gly Val Glu Leu Arg Asp Asn Gln Leu  
 35 40 45

Val Val Pro Ser Glu Gly Leu Tyr Leu Ile Tyr Ser Gln Val Leu Phe  
 50 55 60

Lys Gly Gln Gly Cys Pro Ser Thr His Val Leu Leu Thr His Thr Ile  
 65 70 75 80

Ser Arg Ile Ala Val Ser Tyr Gln Thr Lys Val Asn Leu Leu Ser Ala  
 85 90 95

Ile Lys Ser Pro Cys Gln Arg Glu Thr Pro Glu Gly Ala Glu Ala Lys  
 100 105 110

Pro Trp Tyr Glu Pro Ile Tyr Leu Gly Gly Val Phe Gln Leu Glu Lys  
 115 120 125

Gly Asp Arg Leu Ser Ala Glu Ile Asn Arg Pro Asp Tyr Leu Asp Phe  
 130 135 140

Xaa Glu Ser Gly Gln Val Tyr Phe Gly Ile Ile Ala Leu  
 145 150 155

<210> 25  
 <211> 157  
 <212> PRT  
 <213> Artificial Sequence

<220>  
 <223> synthetic

<220>  
 <221> MISC\_FEATURE  
 <222> (146)..(146)  
 <223> "Xaa" at position 146 can be Asn, Lys, Arg or Ser

<400> 25

Val Arg Ser Ser Ser Arg Thr Pro Ser Asp Lys Pro Val Ala His Val  
1 5 10 15

Val Ala Asn Pro Gln Ala Glu Gly Gln Leu Gln Trp Leu Asn Arg Arg  
20 25 30

Ala Asn Ala Leu Leu Ala Asn Gly Val Glu Leu Arg Asp Asn Gln Leu  
35 40 45

Val Val Pro Ser Glu Gly Leu Tyr Leu Ile Tyr Ser Gln Val Leu Phe  
50 55 60

Lys Gly Gln Gly Cys Pro Ser Thr His Val Leu Leu Thr His Thr Ile  
65 70 75 80

Ser Arg Ile Ala Val Ser Tyr Gln Thr Lys Val Asn Leu Leu Ser Ala  
85 90 95

Ile Lys Ser Pro Cys Gln Arg Glu Thr Pro Glu Gly Ala Glu Ala Lys  
100 105 110

Pro Trp Tyr Glu Pro Ile Tyr Leu Gly Gly Val Phe Gln Leu Glu Lys  
115 120 125

Gly Asp Arg Leu Ser Ala Glu Ile Asn Arg Pro Asp Tyr Leu Asp Phe  
130 135 140

Ala Xaa Ser Gly Gln Val Tyr Phe Gly Ile Ile Ala Leu  
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Val Arg Ser Ser Ser Arg Thr Pro Ser Asp Lys Pro Val Ala His Val  
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Val Ala Asn Pro Gln Ala Glu Gly Gln Leu Gln Trp Leu Asn Arg Arg  
20 25 30

Ala Asn Ala Leu Leu Ala Asn Gly Val Glu Leu Arg Asp Asn Gln Leu  
 35 40 45  
 Val Val Pro Ser Glu Gly Leu Tyr Leu Ile Tyr Ser Gln Val Leu Phe  
 50 55 60  
 Lys Gly Gln Gly Cys Pro Ser Thr His Val Leu Leu Thr His Thr Ile  
 65 70 75 80  
 Ser Arg Ile Ala Val Ser Tyr Gln Thr Lys Val Asn Leu Leu Ser Ala  
 85 90 95  
 Ile Lys Ser Pro Cys Gln Arg Glu Thr Pro Glu Gly Ala Glu Ala Lys  
 100 105 110  
 Pro Trp Tyr Glu Pro Ile Tyr Leu Gly Gly Val Phe Gln Leu Glu Lys  
 115 120 125  
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 Ala Asn Ala Leu Leu Ala Asn Gly Val Glu Leu Arg Asp Asn Gln Leu  
 35 40 45  
 Val Val Pro Ser Glu Gly Leu Tyr Leu Ile Tyr Ser Gln Val Leu Phe  
 50 55 60  
 Glu Gly Gln Gly Cys Pro Ser Thr His Val Leu Leu Thr His Thr Ile  
 65 70 75 80

Ser Arg Ile Ala Val Ser Tyr Gln Thr Lys Val Asn Leu Leu Ser Ala  
85 90 95

Ile Lys Ser Pro Cys Gln Arg Glu Thr Pro Glu Gly Ala Glu Ala Lys  
100 105 110

Pro Trp Tyr Glu Pro Ile Tyr Leu Gly Gly Val Phe Gln Leu Glu Lys  
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Gly Asp Arg Leu Ser Ala Glu Ile Asn Arg Pro Asp Tyr Leu Lys Phe  
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Ala Glu Ser Gly Gln Val Tyr Phe Gly Ile Ile Ala Leu  
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Val Arg Ser Ser Ser Arg Thr Pro Ser Asp Lys Pro Val Ala His Val  
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Val Ala Asn Pro Gln Ala Glu Gly Gln Leu Gln Trp Leu Asn Arg Arg  
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Ala Asn Ala Leu Leu Ala Asn Gly Val Glu Leu Arg Asp Asn Gln Leu  
35 40 45

Val Val Pro Ser Glu Gly Leu Tyr Leu Ile Tyr Ser Gln Val Leu Phe  
50 55 60

Glu Gly Gln Gly Cys Pro Ser Thr His Val Leu Leu Thr His Thr Ile  
65 70 75 80

Ser Arg Ile Ala Val Ser Tyr Gln Thr Lys Val Asn Leu Leu Ser Ala  
85 90 95

Ile Lys Ser Pro Cys Gln Arg Glu Thr Pro Glu Gly Ala Glu Ala Lys  
100 105 110

Pro Trp Tyr Glu Pro Ile Tyr Leu Gly Gly Val Phe Gln Leu Glu Lys

115	120	125
Gly Asp Arg Leu Ser Ala Glu Ile Asn Arg Pro Asp Tyr Leu Arg Phe		
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Ala Asn Ala Leu Leu Ala Asn Gly Val Glu Leu Arg Asp Asn Gln Leu		
35	40	45
Val Val Pro Ser Glu Gly Leu Tyr Leu Ile Tyr Ser Gln Val Leu Phe		
50	55	60
Asp Gly Gln Gly Cys Pro Ser Thr His Val Leu Leu Thr His Thr Ile		
65	70	75 80
Ser Arg Ile Ala Val Ser Tyr Gln Thr Lys Val Asn Leu Leu Ser Ala		
85	90	95
Ile Lys Ser Pro Cys Gln Arg Glu Thr Pro Glu Gly Ala Glu Ala Lys		
100	105	110
Pro Trp Tyr Glu Pro Ile Tyr Leu Gly Gly Val Phe Gln Leu Glu Lys		
115	120	125
Gly Asp Arg Leu Ser Ala Glu Ile Asn Arg Pro Asp Tyr Leu Lys Phe		
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Val Ala Asn Pro Gln Ala Glu Gly Gln Leu Gln Trp Leu Asn Arg Arg  
20 25 30

Ala Asn Ala Leu Leu Ala Asn Gly Val Glu Leu Arg Asp Asn Gln Leu  
35 40 45

Val Val Pro Ser Glu Gly Leu Tyr Leu Ile Tyr Ser Gln Val Leu Phe  
50 55 60

Asp Gly Gln Gly Cys Pro Ser Thr His Val Leu Leu Thr His Thr Ile  
65 70 75 80

Ser Arg Ile Ala Val Ser Tyr Gln Thr Lys Val Asn Leu Leu Ser Ala  
85 90 95

Ile Lys Ser Pro Cys Gln Arg Glu Thr Pro Glu Gly Ala Glu Ala Lys  
100 105 110

Pro Trp Tyr Glu Pro Ile Tyr Leu Gly Gly Val Phe Gln Leu Glu Lys  
115 120 125

Gly Asp Arg Leu Ser Ala Glu Ile Asn Arg Pro Asp Tyr Leu Arg Phe  
130 135 140

Ala Glu Ser Gly Gln Val Tyr Phe Gly Ile Ile Ala Leu  
145 150 155